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DMMP STATUS PAPER

NEANTHES 20-DAY CHRONIC BIOASSAY PROTOCOL ISSUES

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There are now two existing *Neanthes* Chronic bioassay protocols for evaluating dredged material under Section 404 of the Clean Water Act and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA). Under CWA and MPRSA regulations there is a requirement to evaluate the chronic toxicity and sublethal effects of dredged material. Federal regulations (40CFR Part 227.27(b)) state:

"The limiting permissible concentration of the …solid phases of a material is that concentration which will not cause unreasonable acute or chronic toxicity or sublethal adverse effects based on bioassay results using …appropriate sensitive benthic marine organisms."

In accordance with the statutory regulatory requirements, the DMMP agencies and the Washington State Department of Ecology implemented a regional 20-day *Neanthes* Bioassay protocol in 1992 (http://www.nws.usace.army.mil/publicmenu/DOCUMENTS/neant_92.pdf) after a full peer-review and regional development process. The protocol was subsequently adopted as a regional Puget Sound Estuary Program (PSEP) protocol (http://www.psat.wa.gov/Publications/protocols/protocol_pdfs/bioassay.pdf). The DMMP and SMS have over 12 years of highly successful implementation experience with the DMMP/SMS regional protocol. The Evironmental Research Development Center (ERDC), formerly the Waterways Experiment Station (WES) has an alternative *Neanthes* bioassay protocol currently under development for chronic testing of dredged material (Dillon et al. 1993a, 1993b, Bridges et al. 1997a, 1997b). We currently have little information comparing the two protocols, except a limited study conducted by ERDC in 1997. ERDC is now interested in establishing their protocol as the national Corps of Engineers standard for testing dredged material.

The differences between the two protocols need to be evaluated by the DMMP in consultation with regional bioassay practitioners, and the regulated community to ascertain whether changes to the existing DMMP *Neanthes* protocol are necessary. The major differences in the two protocols are highlighted in Table 1, and are test duration (20 days versus 28 days), test design (size of beakers and number of animals per replicate, number of replicate treatments), age of organisms at test initiation, and feeding regime.

The DMMP agencies are interested in conducting a statistically robust, regional comparison of the two protocols to evaluate how they both perform in a regulatory context in evaluating the toxicity of dredged material. The comparison would evaluate the sensitivity and variability of the two protocols, and make judgments as to whether the DMMP protocol needs to be modified. The DMMP agencies do not presently have the funding necessary to conduct this comparison, and are looking for funding opportunities to initiate this study. At the present time both the DMMP and SMS programs are satisfied with the performance of the regional 20-day protocol, and are not experiencing problems with our protocol. Test sensitivity has been raised by ERDC

as an issue relative to our protocol, but any evaluation should also assess test reliability in a regulatory context, so that the DMMP can be better informed about the potential need to make protocol changes.

Table 1. Protocol Comparisons.

Parameter	20-day DMMP/SMS Protocol	28-day ERDC Protocol
Test Chamber	1 Liter Beakers	300 mL Beaker
Organisms/Replicate	5/replicate	1/replicate
Replicates/Treatment	5	10
Organism Age	2-3 weeks	< 7 days
Feeding Regime	40 mg Tetramarin per chamber every other day (8 mg/individual)	2 mg Tetramarin and alfalfa per chamber twice weekly

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